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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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INTERNATIONAL BUSINESS MACHINES CORPORATION
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EXAMINER

ROJAS, BERNARD

ART UNIT	PAPER NUMBER
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2832

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/523,310

Applicant(s)

JAHNES ET AL.

Examiner

Bernard Rojas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 November 2006.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15-19 is/are allowed.
- 6) ☒ Claim(s) 1,3,4,6-8,11-13 is/are rejected.
- 7) ☐ Claim(s) 5,9,10 and 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 11/22/2006 have been fully considered but they are not persuasive.

Applicant states that Hopcroft [US 6,621,387] fails to disclose the use of a plunger and merely discloses the use of a contact pad [410]. The contact pad of Hopcroft is equivalent to the plunger of claim 1. It protrudes downward from the flexible membrane and is reciprocated into and out of conductive contact with at least one conductive path. Applicant has amended the claim so that the plunger is dielectric with a conductive surface.

Applicant states that Hopcroft fails to teach a Mem comprising a flexible membrane since the membrane is formed on a separate substrate and then joined to form the Mem switch. Applicant has not claimed that the flexible membrane and the substrate are monolithic, only that a Mem switch comprises a flexible membrane parallel to a first surface surrounding a cavity.

Applicant states that Hopcroft's membrane [106] is not a functional part of the Mem switch. Hopcroft states that the flexible membrane [106] is used to turn the switch on and off: "The first bridge 106, having a contact on the bridge surface oriented towards the transmission line and aligned with the gap in the transmission line, is operable to close the gap 116 in the transmission line during the "on" state of operation of the switch 100" [col. 5 lines 22-27].

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies

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(i.e., CMOS compatibility) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Claim Rejections - 35 USC § 103

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 3, 4, 6-8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hopcroft [US 6,621,387] in view of James et al. [US 5,627,396] and in further view of Dabbaj [2004/0056742].

Claim 1, Hopcroft discloses a micro-electromechanical system (MEMS) comprising: a cavity [figure 4]; at least one conductive path [110] integral to a first surface bordering said cavity; a flexible membrane [106a] parallel to said first surface bordering said cavity, said flexible membrane having a plurality of actuating electrodes [406, 408] attached thereto; and a plunger [410] attached to said flexible membrane in a direction away from said actuating electrodes, said plunger having at least one conductive surface to make electrical contact with said at least one conductive path.

Hopcroft fails to disclose that the plunger comprises a dielectric material with a conductive surface.

James et al. teaches a Mem switch with a flexible membrane [22] with a plunger [24, 32, 35] that makes electrical contact with at least one conductive path [44]. The plunger is constructed of a dielectric layer [24] followed by conductive contact layers [32, 35].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add the dielectric material as shown by James et al. to the

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plunger assembly of Hopcroft et al, between the flexible membrane and the contact pad, as shown by James et al., in order to further isolate the electrodes on the flexible membrane from the contact pad.

Hopcroft fails to disclose that each of the actuating electrodes is energized by a voltage of opposite polarity of the voltage applied to the adjoining actuating electrodes.

Dabbaj teaches actuating the membrane [figures 1, 2a, 2b] of a micro-electromechanical system (MEMS) [10] by alternating the voltage applied to the adjoining actuating electrodes [1,2].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply to electrostatic actuation system of Dabbaj to the Mems device of Hopcroft in order to provide the membrane with improved flexibility and increased actuation force.

Claim 3, Hopcroft discloses the MEMS switch as recited in claim 1, wherein an electrostatic attraction between said actuating electrodes results in bending curvature of said flexible membrane when said actuating electrodes are energized [as shown by the direction of actuation arrow in figure 4].

Claim 4, Hopcroft discloses the MEMS switch as recited in claim 1, wherein said flexible membrane is made of a dielectric material selected from the group consisting of SiO₂, SiN, carbon-containing materials that include polymers and amorphous hydrogenated carbon and mixtures thereof [col. 3 lines 63 to 70].

Claim 6, Hopcroft discloses the MEMS switch as recited in claim 1, wherein the bending curvature of said flexible membrane urges said at least one conductive surface

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of said plunger against said at least one conductive path integral to said first surface bordering said cavity, closing the MEM switch [col. 8 lines 20-46].

Claim 7, Hopcroft discloses the MEMS switch as recited in claim 1, wherein the removal of said applied voltage returns said flexible membrane to its original shape, pulling away said at least one conductive surface of said plunger from said at least one conductive surface integral to said first surface bordering said gap, opening the MEM switch [col. 8 lines 20-46].

Claim 8, Hopcroft discloses the MEMS switch as recited in claim 1, wherein the bending curvature of said flexible membrane is a concave displacement [col. 8 lines 20-46].

Claim 13, Hopcroft discloses the MEMS switch as recited in claim 1, wherein a gap within said cavity separates said plunger from said at least one conductive path [figure 4].

Claim 20 is rejected under 35 U.S.C. 102(b) as being anticipated by Goldsmith et al. [US 5,619,061].

Claim 20, Goldsmith et al. discloses a single-pole-multiple-throw MEMs comprising a plurality of single-pole-single-throw MEMS switches placed in parallel [figure 5], said plurality of single-pole-single-throw MEMS switches being receptively activated by an independent DC voltage control signal [col. 4 lines 30-60].

Allowable Subject Matter

Claims 15-19 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record does not teach nor suggest, in the claimed combination, a micro-electromechanical system (MEMS) switch comprising: (a) a substrate comprising a conductive metal inlaid path onto which a cavity is formed; (b) on said cavity, a first release layer followed by a first conductive layer and by a second conductive or dielectric layer, said two conductive layers being patterned into the form of an inverted 'T'; (c) a planarized second release layer followed by a third conductive layer; (d) on top of said third conductive layer, a dielectric layer and patterned vias holes to expose a lower conductor; (e) a conductive surface filling said patterned via holes providing a finite thickness above said filled via holes, said conductive surface patterned into the shape of actuating fingers, said combination of (a) through (e) forming a flexible membrane; and (f) via holes perforating said flexible membrane and simultaneously providing access slots outside of said membrane, wherein air replaces said first and second release layers.

Claims 5, 9, 10 and 14 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard Rojas whose telephone number is (571) 272-1998. The examiner can normally be reached on M and W-F, 5:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Elvin G. Enad can be reached on (571) 272-1990. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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